

What is Claimed is:

1. An aqueous dispersion for chemical mechanical polishing comprising an abrasive, an organic compound with an effect of suppressing reduction of performance of polishing pads, and water, the aqueous dispersion for chemical mechanical polishing being characterized in that said organic compound is at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) adenine, (5) a heterocyclic compound with a heteropentacycle, with no benzene ring forming the skeleton, and with a functional group, (6) a heterocyclic compound with a heteropentacycle, with a benzene ring forming the skeleton and with a functional group containing no sulfur atoms, (7) a heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton, and a derivative of any of compounds (1) through (7).

2. An aqueous dispersion for chemical mechanical polishing defined in Claim 1, wherein the heterocyclic compound with a heteropentacycle, with no benzene ring forming the skeleton, and with a functional group is at least one selected from among 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 1H-tetrazole-1-acetic acid, 5-alkyl-1,3,4-thiadiazole-2-thiol, 4-amino-1,2,4-triazole, 5-amino-1H-tetrazole, 2-mercaptothiazoline and 4-amino-3-hydrazino-5-mercapto-1,2,4-triazole, said heterocyclic compound with a heteropentacycle, with a benzene ring forming the skeleton and with a functional group containing no sulfur

atoms is either or both 2-aminobenzothiazole and/or 2-amino-6-alkylbenzothiazole, and said heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton is at least one from among 3-amino-5,6-dialkyl-1,2,4-triazine, 2,3-dicyano-5-alkylpyrazine, 2,4-diamino-6-diallylamino-1,3,5-triazine and phthalazine.

3. An aqueous dispersion for chemical mechanical polishing characterized by comprising an abrasive, an organic compound with an effect of inhibiting generation of pits on polishing surfaces, and water.

Sub 1 4. An aqueous dispersion for chemical mechanical polishing defined in Claim 3, wherein said organic compound is at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) hypoxanthine, (5) guanine, (6) salicylaldehyde, (7) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (8) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring, (9) a heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton, (10) a heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton, (11) a heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton, and a derivative of any of compounds (1) through (11).

5. An aqueous dispersion for chemical mechanical

polishing defined in Claim 4, wherein said compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group is phenylenediamine, said compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring is at least one from catechol and aminophenol, said heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton is at least one selected from among 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 1-(2-dialkylaminoethyl)-5-mercaptotetrazole, bismuthiol, 5-alkyl-1,3,4-thiadiazole-2-thiol, 3-mercapto-1,2,4-triazole, 4-amino-1,2,4-triazole, 5-amino-1H-tetrazole and triazole, said heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton is at least one from among 5-alkyl-1H-benzotriazole, 2-(2-benzotriazolyl)-p-cresol, 2,1,3-benzothiadiazole, benzimidazole, benzotriazole, mercaptobenzothiazole and benzofloxane, and said heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton is at least one from among benzoguanamine, phthalazine and thiocyanuric acid.

6. An aqueous dispersion for chemical mechanical polishing characterized by comprising an abrasive, an organic compound with an effect of flattening uneven sections on polishing surfaces, and water.

7. An aqueous dispersion for chemical mechanical polishing defined in Claim 6, wherein said organic compound is

at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) salicylaldoxime, (5) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (6) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring, (7) a heterocyclic compound with a heteropentacycle, with no benzene ring forming the skeleton, and with a functional group, (8) a heterocyclic compound with a heteropentacycle, with a benzene ring forming the skeleton and with a functional group, (9) a heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton, and a derivative of any of compounds (1) through (9).

8. An aqueous dispersion for chemical mechanical polishing defined in Claim 7, wherein said compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group is phenylenediamine, said compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring is at least one from catechol and aminophenol, said heterocyclic compound with a heteropentacycle, with no benzene ring forming the skeleton and with a functional group is at least one selected from among 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 4,5-dicyanoimidazole, 5-alkyl-1,3,4-thiadiazole-2-thiol, 1-phenyl-5-mercapto-1H-tetrazole, 2-amino-4,5-dicyano-1H-imidazole, 4-amino-1,2,4-triazole, 5-amino-1H-tetrazole, 3-mercapto-4-methyl-4H-1,2,4-triazole and 1H-tetrazole, said

heterocyclic compound with a heteropentacycle, with a benzene ring forming the skeleton and with a functional group is at least one from among mercaptobenzothiazole, benzofloxane and 2,1,3-benzothiadiazole, and said heterocyclic compound with a heterohexacycle bearing two or more hetero atoms and with either or both a functional group and/or a benzene ring forming the skeleton is phthalazine.

9. An aqueous dispersion for chemical mechanical polishing defined in Claim 8, wherein said metal film is a copper film.

10. An aqueous dispersion for chemical mechanical polishing defined in Claim 9, wherein the ratio (S_{10}/S_1) of the tenth removal rate (S_{10}) to the first removal rate (S_1) for 10 repeated chemical mechanical polishing operations of a copper film under the following conditions is 0.9 or greater.

Polishing conditions: Polishing pressure, 250 g/cm²; Table rotation speed, 45 rpm; head rotation speed, 45 rpm; Aqueous dispersion supply rate, 50 ml/min; Polishing time, 3 minute; Porous polyurethane polishing pad.

11. An aqueous dispersion for chemical mechanical polishing characterized by comprising an abrasive, an organic compound with an effect of suppressing reduction of performance of polishing pads and an effect of inhibiting generation of pits on polishing surfaces, and water.

Sub 12. An aqueous dispersion for chemical mechanical polishing defined in any one of Claim 11, wherein said organic compound is at least one from among (1) biphenol, (2) bipyridyl,

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(3) vinylpyridine, (4) hypoxanthine, (5) adenine, (6) guanine, (7) salicylaldoxime, (8) copperon, (9) cysteine, (10) thiourea, (11) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (12) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring, (13) a heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton, (14) a heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton, (15) a heterohexacyclic compound bearing two or more hetero atoms, and a derivative of any of compounds (1) through (15).

13. An aqueous dispersion for chemical mechanical polishing defined in Claim 12, wherein said organic compound is at least one from among bipyridyl, biphenol, vinylpyridine, salicylaldoxime, 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 5-alkyl-1,3,4-thiadiazole-2-thiol, 4-amino-1,2,4-triazole, phthalazine and 5-amino-H-tetrazole.

14. An aqueous dispersion for chemical mechanical polishing defined in Claim 13, wherein said metal film is a copper film.

15. An aqueous dispersion for chemical mechanical polishing defined in Claim 14, wherein the ratio (S_{10}/S_1) of the tenth removal rate (S_{10}) to the first removal rate (S_1) for 10 repeated chemical mechanical polishing operations of a copper film under the following conditions is 0.9 or greater.

Polishing conditions: Polishing pressure, 250 g/cm²;

Table rotation speed, 45 rpm; head rotation speed, 45 rpm; Aqueous dispersion supply rate, 50 ml/min; Polishing time, 3 minute; Porous polyurethane polishing pad.

16. An aqueous dispersion for chemical mechanical polishing characterized by comprising an abrasive, an organic compound with an effect of suppressing reduction of performance of polishing pads and an effect of flattening uneven sections on polishing surfaces, and water.

Sub 23
17. An aqueous dispersion for chemical mechanical polishing defined in Claim 16, wherein said organic compound is at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) hypoxanthine, (5) adenine, (6) guanine, (7) salicylaloxime, (8) copperon, (9) cysteine, (10) thiourea, (11) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (12) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring, (13) a heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton, (14) a heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton, (15) a heterohexacyclic compound bearing two or more hetero atoms, and a derivative of any of compounds (1) through (15).

18. An aqueous dispersion for chemical mechanical polishing defined in Claim 17, wherein said organic compound is at least one from among bipyridyl, biphenol, vinylpyridine, salicylaloxime, 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 5-alkyl-1,3,4-thiadiazole-2-

thiol, 4-amino-1,2,4-triazole, phthalazine and 5-amino-H-tetrazole.

19. An aqueous dispersion for chemical mechanical polishing defined in Claim 18, wherein said metal film is a copper film.

20. An aqueous dispersion for chemical mechanical polishing defined in Claim 19, wherein the ratio (S_{10}/S_1) of the tenth removal rate (S_{10}) to the first removal rate (S_1) for 10 repeated chemical mechanical polishing operations of a copper film under the following conditions is 0.9 or greater.

Polishing conditions: Polishing pressure, 250 g/cm²; Table rotation speed, 45 rpm; head rotation speed, 45 rpm; Aqueous dispersion supply rate, 50 ml/min; Polishing time, 3 minute; Porous polyurethane polishing pad.

21. An aqueous dispersion for chemical mechanical polishing characterized by comprising an abrasive, an organic compound with an effect of inhibiting generation of pits on polishing surfaces and an effect of flattening uneven sections on polishing surfaces, and water.

Sub 4 22. An aqueous dispersion for chemical mechanical polishing defined in Claim 21, wherein said organic compound is at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) hypoxanthine, (5) adenine, (6) guanine, (7) salicylaldehyde, (8) copperon, (9) cysteine, (10) thiourea, (11) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (12) a compound with a total of two or more amino groups and/or hydroxyl groups

bonded to a benzene ring, (13) a heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton, (14) a heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton, (15) a heterohexacyclic compound bearing two or more hetero atoms, and a derivative of any of compounds (1) through (15).

23. An aqueous dispersion for chemical mechanical polishing defined in Claim 22, wherein said organic compound is at least one from among bipyridyl, biphenol, vinylpyridine, salicylaldoxime, 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 5-alkyl-1,3,4-thiadiazole-2-thiol, 4-amino-1,2,4-triazole, phthalazine, 5-amino-H-tetrazole, mercaptobenzothiazole, benzofloxane, 2,1,3-benzothiadiazole, catechol and aminophenol.

24. An aqueous dispersion for chemical mechanical polishing defined in Claim 23, wherein said metal film is a copper film.

25. An aqueous dispersion for chemical mechanical polishing defined in Claim 24, wherein the ratio (S_{10}/S_1) of the tenth removal rate (S_{10}) to the first removal rate (S_1) for 10 repeated chemical mechanical polishing operations of a copper film under the following conditions is 0.9 or greater.

Polishing conditions: Polishing pressure, 250 g/cm²; Table rotation speed, 45 rpm; head rotation speed, 45 rpm; Aqueous dispersion supply rate, 50 ml/min; Polishing time, 3 minute; Porous polyurethane polishing pad.

26. An aqueous dispersion for chemical mechanical

polishing characterized by comprising an abrasive, an organic compound with an effect of suppressing reduction of performance of polishing pads, an effect of inhibiting generation of pits on polishing surfaces and an effect of flattening uneven sections on polishing surfaces, and water.

Sup 65 27. An aqueous dispersion for chemical mechanical polishing defined in Claim 26, wherein said organic compound is at least one from among (1) biphenol, (2) bipyridyl, (3) vinylpyridine, (4) hypoxanthine, (5) adenine, (6) guanine, (7) salicylaldoxime, (8) copperon, (9) cysteine, (10) thiourea, (11) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to an alkylene group, (12) a compound with a total of two or more amino groups and/or hydroxyl groups bonded to a benzene ring, (13) a heterocyclic compound with a heteropentacycle and with no benzene ring forming the skeleton, (14) a heterocyclic compound with a heteropentacycle and with a benzene ring forming the skeleton, (15) a heterohexacyclic compound bearing two or more hetero atoms, and a derivative of any of compounds (1) through (15).

28. An aqueous dispersion for chemical mechanical polishing defined in Claim 27, wherein said organic compound is at least one from among 7-hydroxy-5-alkyl-1,3,4-triazaindolizine, 2-amino-1,3,4-thiadiazole, 5-alkyl-1,3,4-thiadiazole-2-thiol, 4-amino-1,2,4-triazole, phthalazine and 5-amino-H-tetrazole.

29. An aqueous dispersion for chemical mechanical polishing defined in Claim 28, wherein said metal film is a

copper film.

30. An aqueous dispersion for chemical mechanical polishing defined in Claim 29, wherein the ratio (S_{10}/S_1) of the tenth removal rate (S_{10}) to the first removal rate (S_1) for 10 repeated chemical mechanical polishing operations of a copper film under the following conditions is 0.9 or greater.

Polishing conditions: Polishing pressure, 250 g/cm²;
Table rotation speed, 45 rpm; head rotation speed, 45 rpm;
Aqueous dispersion supply rate, 50 ml/min; Polishing time, 3 minute; Porous polyurethane polishing pad.

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